Monolithic structures of DEAP films

Hassouneh, Suzan Sager; Skov, Anne Ladegaard

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Monolithic structures of DEAP films

Suzan Hassouneh and Anne Ladegaard Skov
The Danish Polymer Centre, Department of Chemical and Biochemical Engineering,
Technical University of Denmark, DK-2800 Kgs. Lyngby, Denmark
shas@kt.dtu.dk

Dielectric electro active polymers (DEAP) have gained much ground in many different applications, such as wave energy harvesting, valves and loudspeakers. The DEAP are produced as thin films, where one side is a PDMS (**p**oly**d**i**m**ethyl**s**iloxane) and the other side is coated with a thin layer of electrodes, produced by Danfoss PolyPower A/S [1]. In order to exploit the technology best, the films are adhered together in multiple layers to make it more robust and give it a longer life time.
The aim of this study is therefore to investigate different procedures on how to laminate the films together and make the stack (figure 1) act as a unit. The different sides of the films can be adhered together, so the adhesion can be silicone-to-silicone, silicone-to-electrode or electrode-to-electrode.

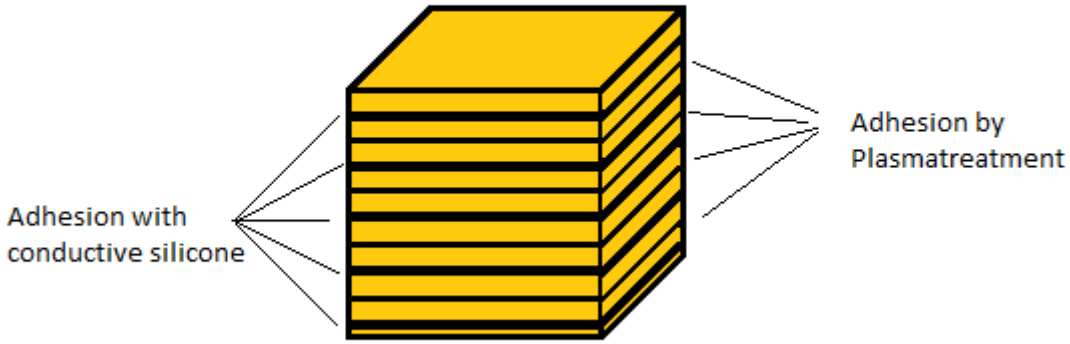

Figure 1: Stack of DEAP films

The different configurations require different methods for adhering. The silicone-to-silicone and electrode-to-electrode adhesion have been investigated. For silicone-to-silicone different approaches has been investigated and the plasma treatment has shown the best results.
For the electrode-to-electrode adhesion a conductive silicone (LR 3162) from Wacker Chemie AG is used as glue. There are different methods for adding the conductive silicone and two methods are investigated. One method is where the conductive silicone is coated on the DEAP-film and one where the conductive silicone is airbrushed on.

[1] Kiil, H and Benslimane, M (2009) Scalable industrial manufacturing of DEAP. Proceedings of SPIE, San Diego, California, USA. 72870R-1 - 72870R-10.